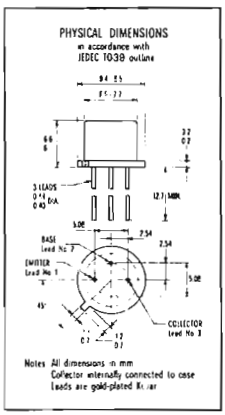
BSX 30

HIGH-SPEED SATURATED SWITCH

NPN DIFFUSED SILICON PLANAR EPITAXIAL TRANSISTOR

GENERAL DESCRIPTION - The BSX 30 is an NPN double-diffused silicon PLANAR epitaxial transistor designed primarily for high-speed commercial switching applications at collector currents up to 500 milliamperes and collector voltages up to 60 volts. It is an excellent core driver with switching times guaranteed at 300 and 500 mA, and an V_{CEO} of 30 volts.



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	-65°C to + 200°C
Operating Junction Temperature	200°C Maximum
Lead Temperature (Soldering, 60 sec Time Limit)	300°C Maximum

Maximum Power Dissipations

Total Dissipation at 25°C Case Temperature (Notes 2 and 3)	3.0 Watts
at 25°C Ambient Temperature (Notes 2 and 3)	0.8 Watt

Maximum Voltages

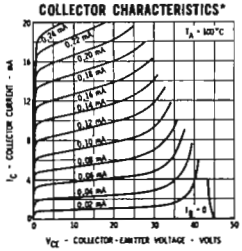
V_{CBO}	Collector to Base Voltage	60 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	30 Volts
V_{EBO}	Emitter to Base Volrage	5.0 Volts

ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

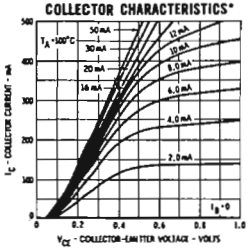
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS	
h_{FE}	DC Pulse Current Gain (Note 5)	30	63	120		I_C = 150 mA	V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 5)	10	50			I_C = 300 mA	V_{CE} = 0.7 V
V_{BE} (sat)	Base Saturation Voltage (Note 5)		0.85	1.2	V	I_C = 150 mA (pulsed)	I_B = 15 mA
V_{BE} (sat)	Base Saturarion Voltage (Note 5)		1.12	1.6	V	I_C = 500 mA (pulsed)	I_B = 50 mA
V_{CE} (sat)	Collector Saturation Voltage (Note 5)		0.23	0.4	V	I_C = 150 mA (pulsed)	I_B = 15 mA
V_{CE} (sat)	Collector Saturation Voltage (Note 5)		0.46	1.0	V	I_C = 500 mA (pulsed)	I_B = 50 mA
I_{CES}	Collector Reverse Currenr		0.05	0.2	µA	V_{BE} = 0	V_{CE} = 30 V
I_{CBO} (125°C)	Collector Cutoff Current		6.5	200	µA	I_E = 0	V_{CB} = 30 V
BV_{CBO}	Collector to Base Breakdown Voltage	60			V	I_C = 100 µA	I_E = 0
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0			V	I_E = 100 µA	I_C = 0
V_{CEO} (sust)	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	30			V	I_C = 30 mA (pulsed)	I_B = 0
h_{fe}	High Frequency Current Gain (f= 100 Mc/s)	2.5	3.3			I_C = 50 mA	V_{CE} = 10 V
C_{ob}	Output Capacitance		5.0	8.0	pF	I_E = 0	V_{CB} = 10 V
t_{on}	Turn On Time (Note 6)		22	40	nsec	I_C = 300 mA	I_{B1} = 30 mA
t_{on}	Turn On Time (Note 6)		22	40	nsec	I_C = 500 mA	I_{B1} = 50 mA
t_{off}	Turn Off Time (Note 6)		22	60	nsec	I_C = 300 mA, I_{B1} = 30 mA,	I_{B2} = -30 mA
t_{off}	Turn Off Time (Note 6)		22	60	nsec	I_C = 500 mA, I_{B1} = 50 mA,	I_{B2} = -50 mA

TYPICAL ELECTRICAL CHARACTERISTICS

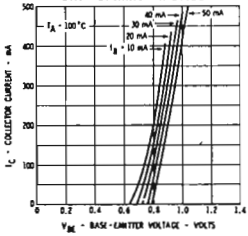
COLLECTOR CHARACTERISTICS*



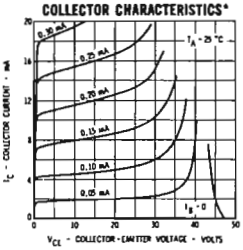
COLLECTOR CHARACTERISTICS*



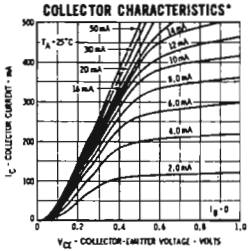
BASE CHARACTERISTICS*



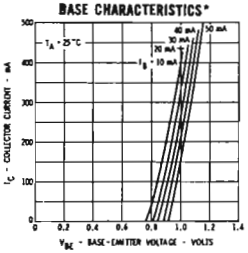
COLLECTOR CHARACTERISTICS*



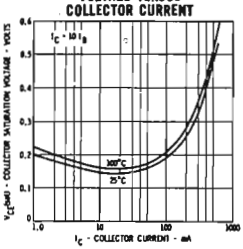
COLLECTOR CHARACTERISTICS*



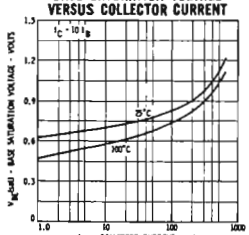
BASE CHARACTERISTICS*



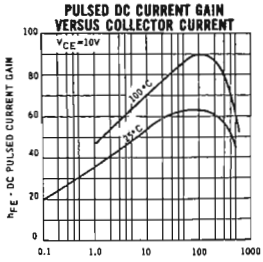
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



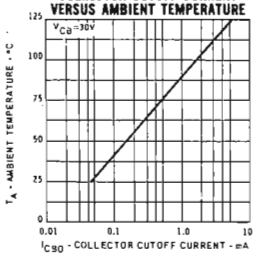
PULSED DC CURRENT GAIN VERSUS COLLECTOR CURRENT



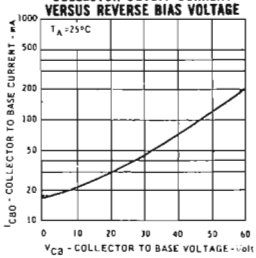
* Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS

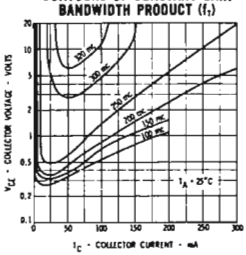
COLLECTOR CUTOFF CURRENT VERSUS AMBIENT TEMPERATURE



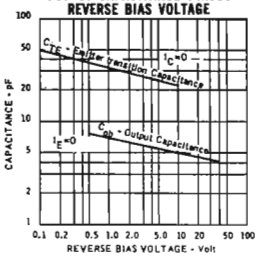
COLLECTOR CUTOFF CURRENT VERSUS REVERSE BIAS VOLTAGE



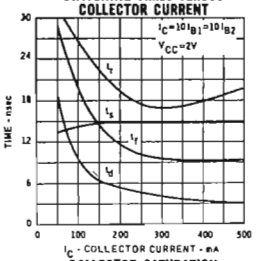
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_T)



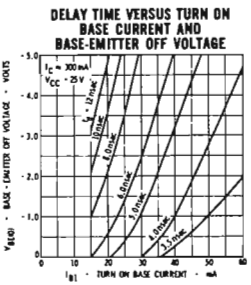
EMITTER TRANSISTION AND OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



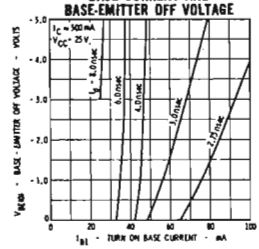
SWITCHING TIMES VERSUS COLLECTOR CURRENT



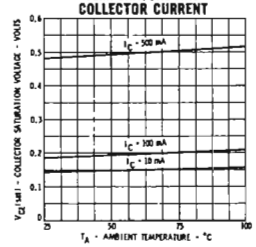
DELAY TIME VERSUS TURN ON BASE CURRENT AND BASE-EMITTER OFF VOLTAGE



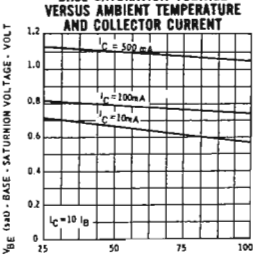
DELAY TIME VERSUS TURN ON BASE CURRENT AND BASE-EMITTER OFF VOLTAGE



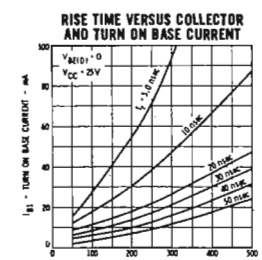
COLLECTOR SATURATION VOLTAGE VERSUS AMBIENT TEMPERATURE AND COLLECTOR CURRENT



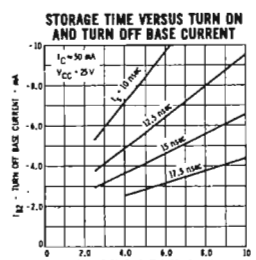
BASE SATURATION VOLTAGE VERSUS AMBIENT TEMPERATURE AND COLLECTOR CURRENT



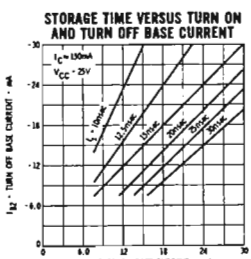
RISE TIME VERSUS COLLECTOR AND TURN ON BASE CURRENT



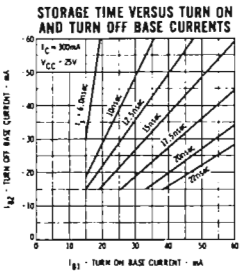
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT

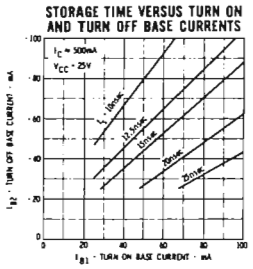


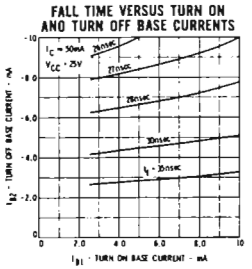
STORAGE TIME VERSUS TURN ON AND TURN OFF BASE CURRENT

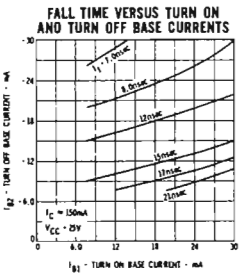


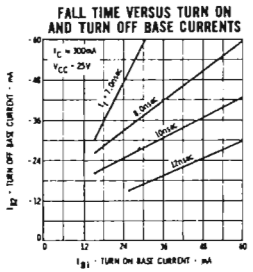
TYPICAL SWITCHING CHARACTERISTICS

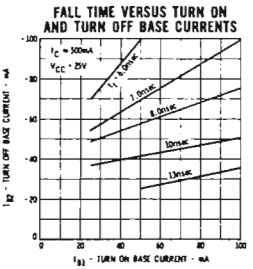




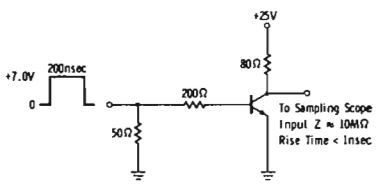






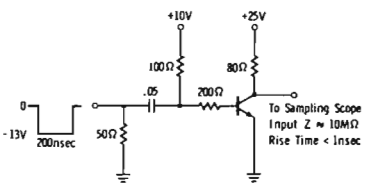


t_{on} TEST CIRCUIT ($I_C \approx 300$ mA)



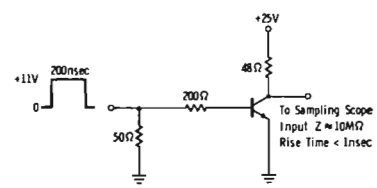
Rise time of input pulse < 2.0nsec
Input impedance ≈ 50Ω

t_{off} TEST CIRCUIT ($I_C \approx 300$ mA)



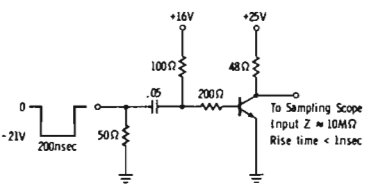
Rise Time of input pulse < 2.0nsec
Input impedance ≈ 50Ω

t_{on} TEST CIRCUIT ($I_C \approx 500$ mA)



Rise time of input pulse < 2.0nsec
Input impedance ≈ 50Ω

t_{off} TEST CIRCUIT ($I_C \approx 500$ mA)



Rise time of input pulse < 2.0nsec
Input impedance ≈ 50Ω

NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.

(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

(3) These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 58.3°C/watt (derating factor of 17.2 mW/°C). Junction-to-ambient thermal resistance of 219°C/watt (derating factor of 4.6 mW/°C).

(4) Rating refers to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS Publication AR 5.

(5) Pulse Conditions: length = 300 μsec; duty cycle = 1%.

(6) See switching circuits for exact values of I_C, I_{B1}, and I_{B2}.